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E05B 65/19

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(56) Documents Cited

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(58) Field of Search

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INT CL<sup>6</sup> E05B 65/19 65/32

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## (54) Latch device for vehicle back door

(57) A vehicle back door latch device has a striker (2) fixed to a vehicle body, and a latch assembly (4) fixed to a vehicle back door. The latch assembly comprises a main metal plate (12) having a box-shaped portion for enclosing a latch (14), and a sub metal plate (13) fixed to the main metal plate (12) so as to cover an upper opening of the box-shaped portion. The box-shaped portion is defined by a bottom wall (52), a front wall (16), a rear wall (17), a right-hand wall (18) and a left-hand wall (19). A main notch portion (20) and a sub notch portion (20a) are respectively formed in the bottom wall (52) and the front wall (16) for receiving the striker (2) when the back door is closed. The rear wall (17) is formed into an arc shape bulging outwards. Engaging portions (35) are respectively formed on both sides of the sub notch portion (20a) of the front wall (16), and studs (11) which are engaged with the engaging portions (35) when the back door is closed are fixed to the striker (2). A convex portion (55) is formed in the main metal plate (12) and a concave portion (34) which is engageable with the convex portion (55) is formed in the sub metal plate (13).

FIG.4

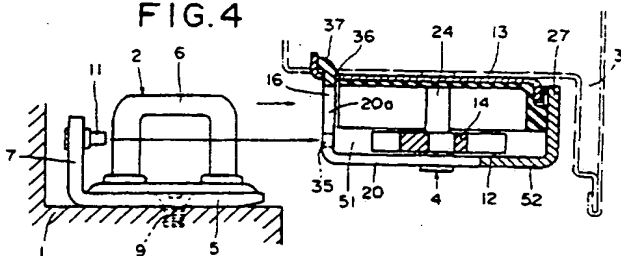
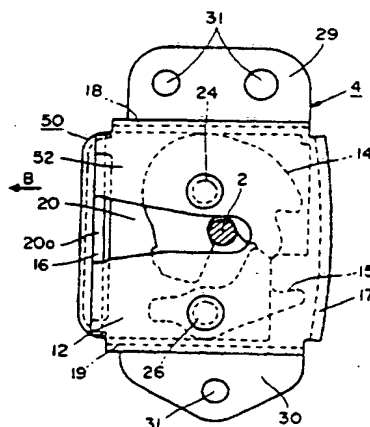
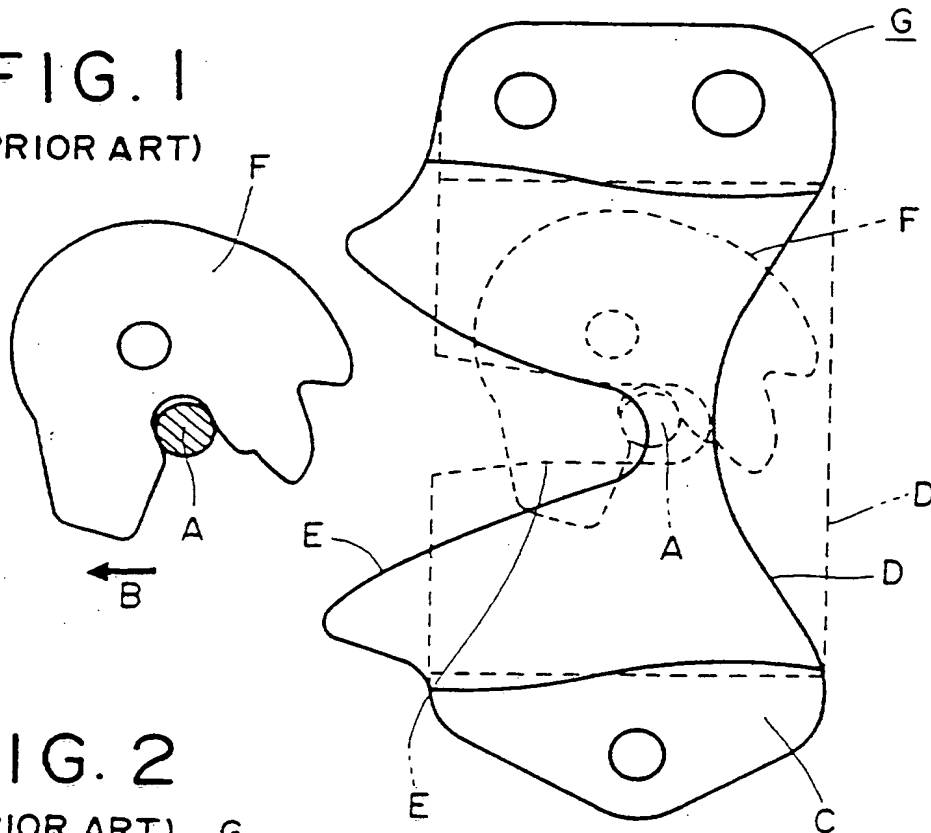


FIG.6

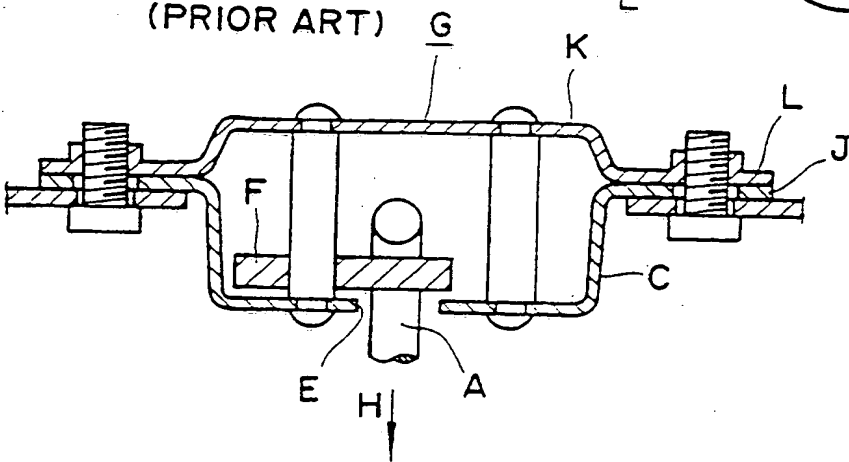


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**FIG. 1**  
(PRIOR ART)



**FIG. 2**  
(PRIOR ART)



**FIG. 3**  
(PRIOR ART)

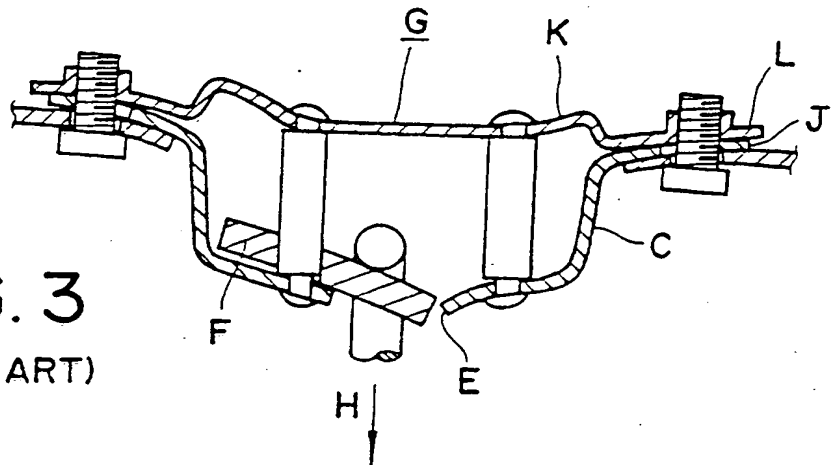


FIG. 4

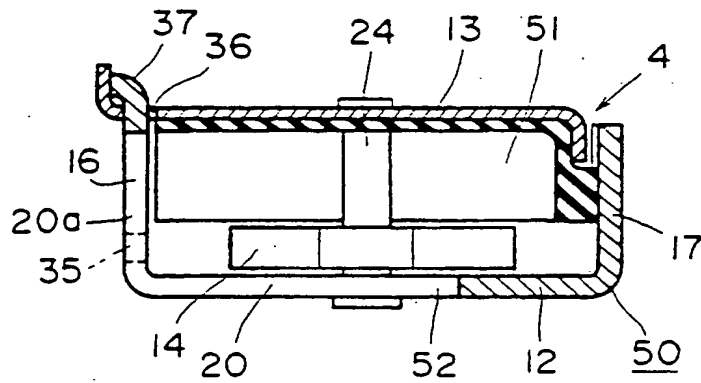
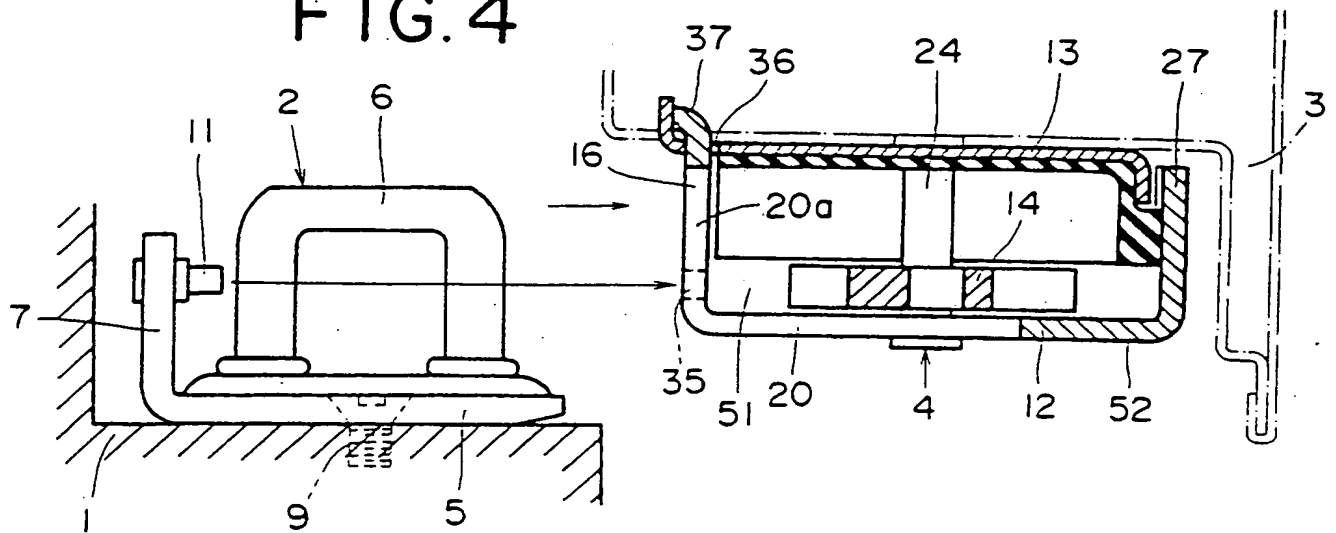


FIG. 8

FIG. 9

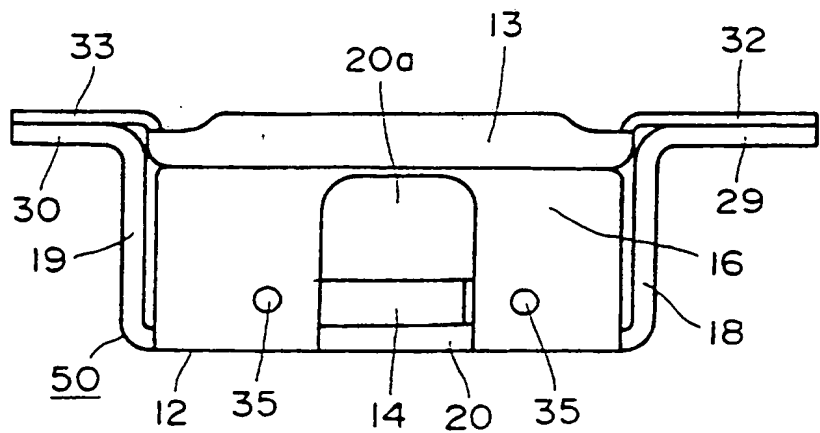
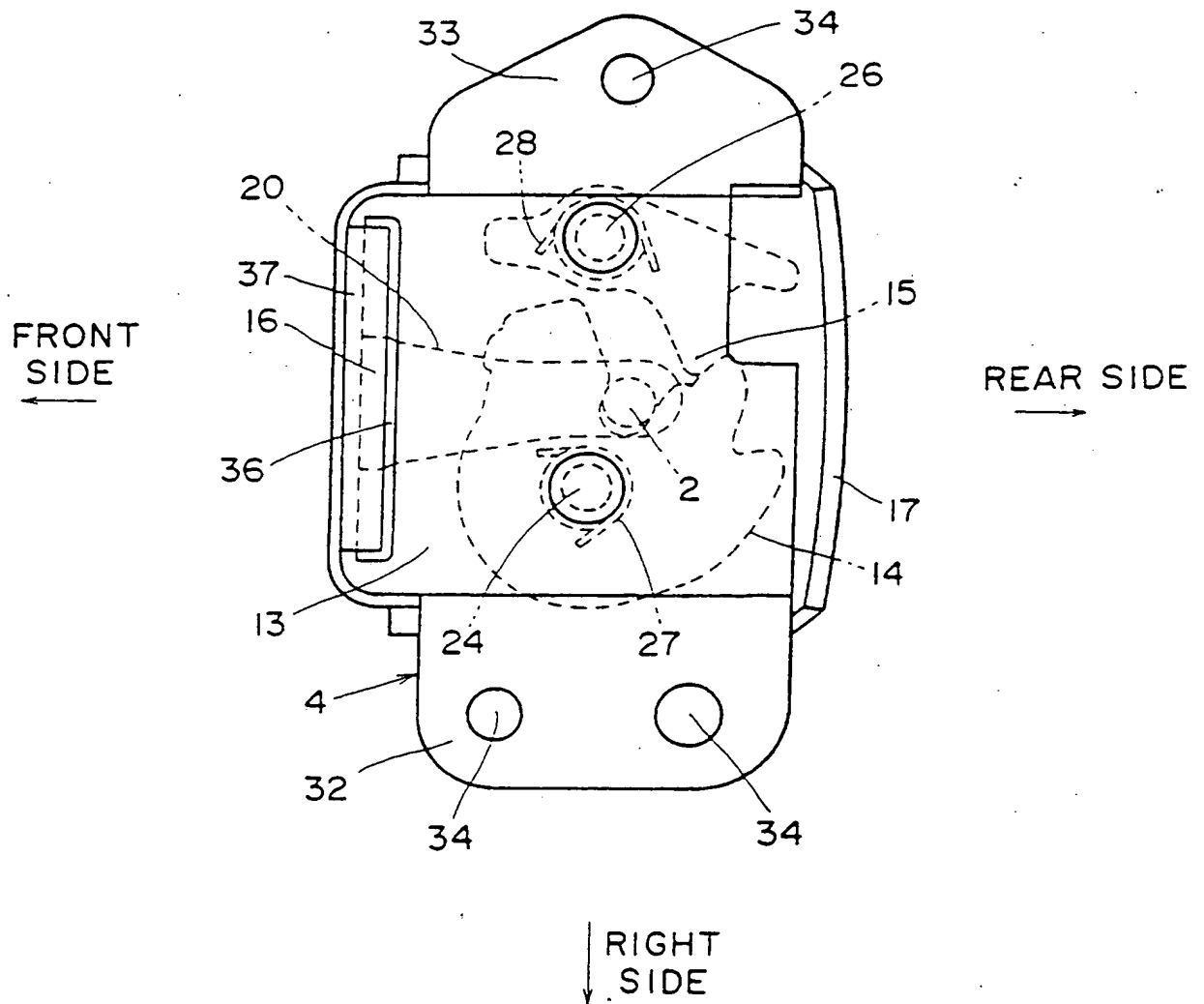


FIG. 5

LEFT SIDE



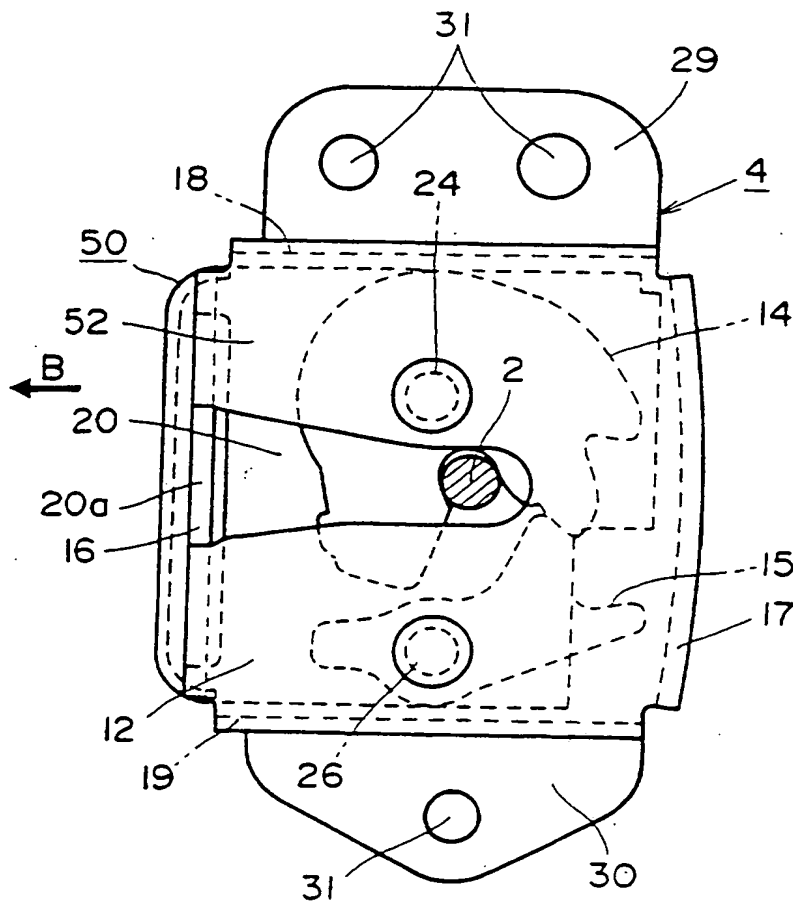


FIG. 6

FIG. 7

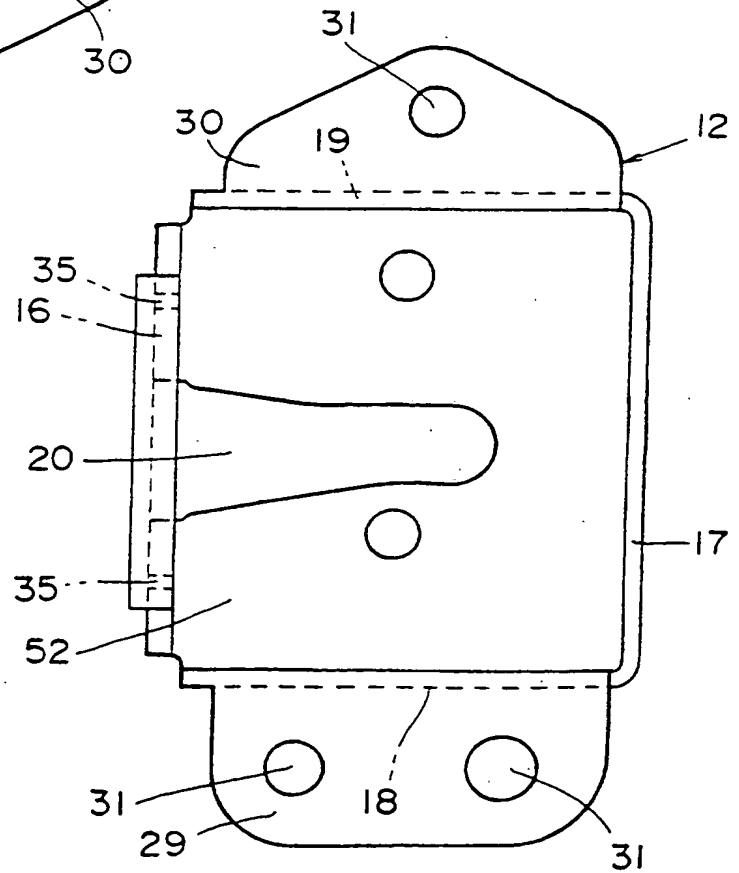


FIG. 10

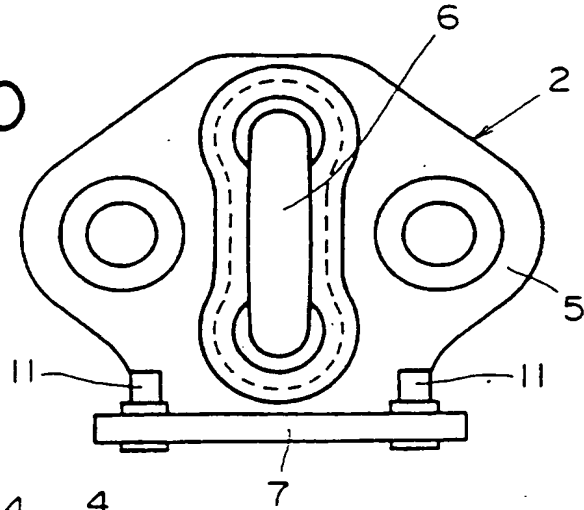


FIG. 11

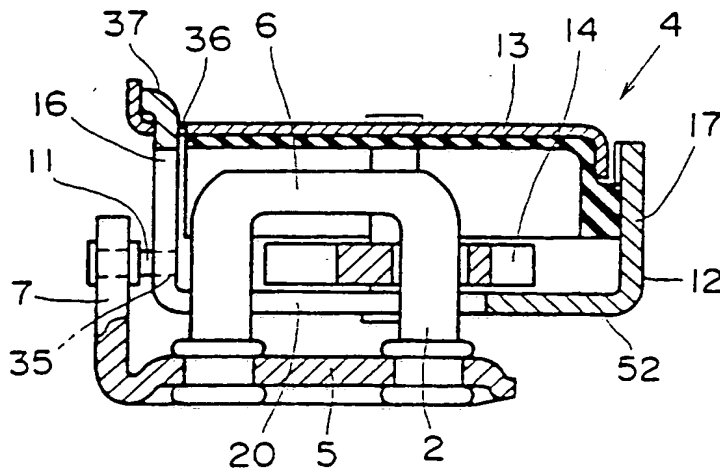


FIG. 12

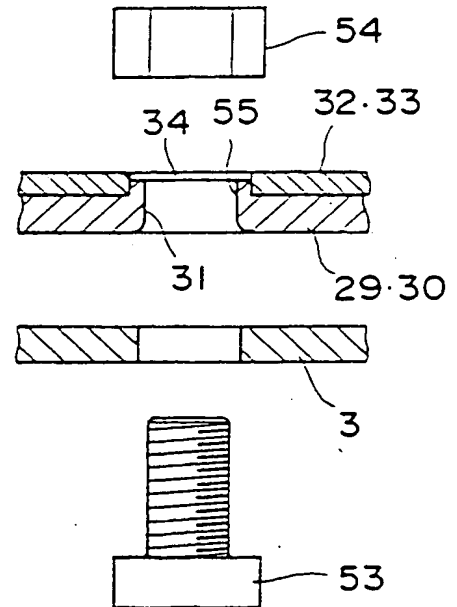
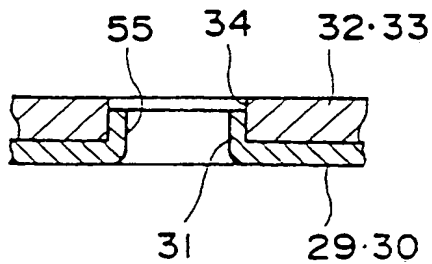


FIG. 13





# LATCH DEVICE FOR VEHICLE BACK DOOR

The present invention relates to a latch device for a vehicle back door and particularly relates to a latch device for improving strength and rigidity of a housing thereof.

A housing of a latch device used in a vehicle back door is conventionally constructed by a main metal plate and a sub metal plate fixed to the main plate. A space is formed within the housing for a latch which is engageable with a striker and a ratchet which is engageable with the latch for holding the engagement of the latch with the striker. The main plate is formed by press drawing working into a box shape having upright front and rear walls, upright right-hand and left-hand walls, and a bottom wall. The sub plate is attached to the main plate so as to cover an upper opening of the box to define the space within the housing. A main notch portion and a sub notch portion for receiving the striker when the back door is closed are respectively formed in the bottom wall and the front wall. The strength of the housing thus formed substantially depends on strengths of the two metal plates.

FIG. 1 shows test results obtained by applying a large load to the conventional latch device. As can be clearly seen from FIG. 1, when a striker A is pulled by the load in the direction of an arrow B, a rear wall D of the main plate C which is originally flat as shown by a phantom line is greatly curved as shown by a solid line and a main notch portion E of the main plate C is greatly opened so that a latch F is disengaged from a housing G. This problem can be overcome by arranging a reinforcing member within the housing as in a latch device of a vehicle swinging door. However, it is not realistic to add such a reinforcing member to a latch device for the back door since the back door latch device must be manufactured at low cost.

FIGS. 2 and 3 show test results obtained by applying a large load to the striker A in a different direction. When the load is

applied to the striker A in the direction of an arrow H, the main plate C is strongly pulled downward. As a result, a shift is caused between an attaching portion J of the main plate C and an attaching portion L of the sub plate K. It has become clear that this shift further promotes deformation of the main plate C.

Accordingly, an object of the present invention is to provide a back door latch device having improved strength in a rear wall of a main plate.

Another object of the present invention is to provide a latch device for preventing a notch portion formed in the main plate from being opened by external force.

Another object of the present invention is to provide a latch device in which no shift is easily caused between an attaching portion of the main plate and an attaching portion of a sub plate.

The invention provides a device as claimed in claim 1.

The invention is illustrated by way of example in the accompanying drawings, in which;

FIGS. 1 to 3 are views showing the results of a strength test of a conventional back door latch device.

FIG. 4 is a view showing a latch assembly attached to a vehicle back door and a striker fixed to a vehicle body.

FIG. 5 is a plan view of the latch assembly.

FIG. 6 is a bottom view of the latch assembly.

FIG. 7 is a plan view of a main metal plate.

FIG. 8 is a longitudinal sectional view of the latch assembly.

FIG. 9 is a front view of the latch assembly.

FIG. 10 is a plan view of the striker.

FIG. 11 is a cross-sectional view showing a state in which a latch is engaged with the striker.

FIG. 12 is an enlarged sectional view of a main attaching portion and a sub attaching portion, and

FIG. 13 is a view showing a modified example of FIG. 12.

As shown in FIG. 4, a latch device of the present invention has a latch assembly 4 fixed to a back door or a boot lid 3 of a vehicle and a striker 2 fixed to a vehicle body 1. A housing 50 of the latch assembly 4 is constructed by a substantially box-shaped main metal plate 12 and a metal sub plate 13 fixed to an upper portion of the main plate 12 so as to cover an upper opening of the main plate 12. A space 51 for a latch 14 which is engageable with the striker 2 and a ratchet 15 which is engageable with the latch 14 so as to hold the engagement of the latch 14 with the striker 2, is arranged within the housing 50. In an alternative arrangement the latch assembly 4 may be attached to the vehicle body 1. In this case, the striker 2 is naturally fixed to the back door 3.

The latch 14 and the ratchet 15 are rotatably attached to the housing 50 by shafts 24 and 26, respectively. In FIG. 5, the latch 14 is biased by the resilient force of a spring 27 in a counterclockwise direction, and the ratchet 15 is biased by the resilient force of a spring 28 in a clockwise direction.

The main plate 12 is formed by press drawing working into a box shape having an upright front wall 16, an upright rear wall 17, an upright right-hand wall 18, an upright left-hand wall 19, and a bottom wall 52. A main notch portion 20 and a sub notch portion 20a are respectively formed in the bottom wall 52 and the front wall 16 for receiving the striker 2 when the back door 3 is closed.

A short hook 37 at an upper portion of the front wall 16 is angled to extend forward and is engaged with a slit 36 formed in the sub plate 13.

As clearly shown in FIGS. 5 and 6, the upright rear wall 17 is not formed in the shape of a flat wall, but is formed in the shape of an arcuate wall bulging outwards. Therefore, great forward deformation of the rear wall 17 is prevented even when a strong forward external force is applied to the striker 2, i.e., in the direction of an arrow B.

As seen in Fig.9 the main plate 12 has a main right-hand attaching portion 29 which is angled to extend horizontally from an upper portion of the upright right-hand wall 18, and a main left-hand attaching portion 30 which is angled to extend horizontally from an upper portion of the upright left-hand wall 19. The sub plate 13 has a sub right-hand attaching portion 32 corresponding to the right-hand attaching portion 29 and a sub left-hand attaching portion 33 corresponding to the left-hand attaching portion 30. The right-hand attaching portions 29, 32 and the left-hand attaching portions 30, 33 are fixed to the back door 3 by using bolts 53 and nuts 54 (Fig.12).

Holes 31 through which the bolts 53 are inserted are formed in the main attaching portions 29 and 30. Holes 34 through which the bolts 53 are inserted are formed in the sub attaching portions 32, 33. As shown in FIG. 12, a diameter of each of the holes 31 is set to be slightly smaller than that of each of the holes 34. Each of the holes 31 has a ring-shaped flange 55 integrally formed with the main attaching portions 29, 30 which is inserted into a corresponding one of the holes 34. The length of the flange 55 is set to be shorter than thickness of the sub attaching portions 32, 33. The engagement between the ring-shaped flanges 55 and the holes 34 prevents generation of the shift explained with reference to FIGS. 2 and 3. FIG. 13 shows a modified example in which the flange 55 is formed in each of the holes 34 of the sub attaching portions 32, 33. In the example of FIG. 13, the use of a nut can be omitted by forming a screw groove in each of the flange 55 and a hole 34.

As shown in FIGS. 4, 10 and 11, the striker 2 has a metal base plate 5 fixed to the vehicle body 1 by a screw or bolt 9, and a substantially U-shaped rod 6 fixed to the base plate 5. A bent

wall 7 is formed in an end portion of the base plate 5 and angled to substantially extend in parallel to the front wall 16.

No bent wall 7 comes in contact with the front wall 16 even when the back door 3 is closed. At least two metal studs 11 projecting toward the front wall 16 are fixed to the bent wall 7. Concave portions or holes 35 for respectively receiving the studs 11 when the back door 3 is closed are formed on both sides of the sub notch portion 20a of the front wall 16. When the studs 11 are respectively engaged with the holes 35 by closing the back door, it is very difficult to widen the front wall 16 leftward and rightward with the sub notch portion 20a as a center. Thus, it is also prevented that the bottom wall 52 is widened leftward and rightward with the main notch portion 20 as a center.

The foregoing discussion discloses and describes merely exemplary embodiment of the present invention only. One skilled in the art will readily recognize from such discussion, and from the accompanying drawings and claims, that various changes, modifications and variations can be made therein without departing from the spirit and scope of the invention as defined in the following claims.

CLAIMS

1. A vehicle back door latch device comprising a striker for fixing to a vehicle body or a vehicle back door, and a latch assembly for fixing to the the vehicle back door or the vehicle body, said latch assembly comprising;

a latch for engagement with the striker to hold the door closed;

a main metal plate having a box-shaped portion for receiving the latch, said box-shaped portion being defined by a bottom wall, a front wall, a rear wall, a right-hand wall and a left-hand wall;

a sub metal plate fixed to the main metal plate so that an upper opening of the box-shaped portion is covered by the sub metal plate;

a main notch portion formed in the bottom wall of the box-shaped portion for receiving the striker when the back door is closed; and

a sub notch portion formed in the front wall of the box-shaped portion for receiving the striker when the back door is closed;

wherein the said rear wall of the box-shaped portion is formed into an arc shape bulging outwards.

2. A latch device according to claim 1, wherein engaging portions are respectively formed on both sides of the sub notch portion of the front wall, and studs are fixed to the striker and arranged for engagement with said engaging portions when the back door is closed.

3. A latch device according to claim 2, wherein said striker has a base plate for fixing to the vehicle body or the back door, a rod fixed to the base plate and engageable with the latch, and a bent wall fixed to the base plate and arranged, in use, to be substantially parallel to the front wall of said box-shaped portion; said studs being fixed to the bent wall.

4. A latch device according to claim 2 or 3, wherein said studs extend toward the front wall.

5. A latch device according to any one of claims 1-4, wherein said main metal plate has a main attaching portion and said sub metal plate has a sub attaching portion; said main attaching portion and said sub attaching portion are arranged to be fixed to the vehicle body or the back door by bolts or screws, a convex portion is formed in one of said main attaching portion and said sub attaching portion; and a concave portion which is engageable with the convex portion is formed in the other of the main attaching portion and said sub attaching portion.

6. A latch device according to claim 5, wherein said main attaching portion has a main hole into which a bolt or screw can be inserted, and said sub attaching portion has a sub hole into which the bolt or screw can be inserted; said convex portion is formed on a flange integral with said main attaching portion in a concentric with the main hole, and said concave portion is provided by the sub hole having a diameter slightly larger than that of the main hole.

7. The latch device according to claim 5, wherein said main attaching portion has a main hole into which a bolt or screw can be inserted, and said sub attaching portion has a sub hole into which the bolt or screw can be inserted; said convex portion is formed on a flange integral with said sub attaching portion, concentric shape with respect to the sub hole, and said concave portion is provided by the main hole having a diameter slightly larger than that of the sub hole.

8. A latch device substantially as described herewith with reference to Figs. 4-12 of the accompanying drawings.





Application No: GB 9717466.8  
Claims searched: All

Examiner: Mr A Angele  
Date of search: 5 November 1997

## Patents Act 1977 Search Report under Section 17

### Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): E2A(AEC, APG, AARN)

Int Cl (Ed.6): E05B-065/19, -065/32

Other:

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A	US 5445326 A J FERRO & L MARCHIOLI	
A	US 4896907 A O SEISAKUSHO	
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